

配置BGP IPv6 Flowspec

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簡介

本文描述如何在ASR1K上配置邊界網關協定(BGP)IPv6 Flowspec。

必要條件

需求

思科建議您瞭解以下主題：

- 獨立於平台

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- IOS-XE
- ASR1000
- ASR9K
- ASR1K
- BGP
- Flowspec
- IPv6

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

背景資訊

Flowspec指定通過BGP分發流規範規則的過程，並定義將流規範規則編碼為邊界網關協定網路層可達性資訊(BGP NLRI)的程式，該資訊可在任何應用中使用。它還定義了用於資料包過濾的應用程式，以緩解（分散式）拒絕服務攻擊。

限制

以下是組態的限制：

- flowspec規則中不允許混合使用地址系列。
- 在多匹配方案中，僅應用第一個匹配的flowspec規則。
- 每個系統最多支援3000 flowspec規則。

設定

在本示例中，我們將ASR9K配置為控制器，將ASR1K配置為PE、RR和Flowspec客戶端。

這是IPv6 Flowspec工作所需的最低配置。

On controller to push the policy to PE/client:

```
class-map type traffic match-all FLOWSPEC
  match destination-address ipv6 2001:db8::/32 <<<<< Match destination address/subnet.
end-class-map
!
policy-map type pbr FS_P
  class type traffic FLOWSPEC <<<<< Apply class-map under policy-map.
  drop
!
flowspec
  address-family ipv4
    service-policy type pbr FSP_V4
  !
  address-family ipv6
    service-policy type pbr FS_P <<<<< Apply policy-map inside Flowspec under AF.
  !
```

On PE/client is to enable IPv6 flowspec AF under BGP.

```
address-family ipv6 flowspec <<<<< Under ipv6 flowspec AF, activate the
neighbor.
  neighbor 10.192.202.5 activate
  neighbor 10.192.202.5 validation off
```

To apply the flowspec policy on interface, "local-install interface-all" command is must under flowspec.

```
flowspec
  local-install interface-all <<<<< Push the policy on interface.
```

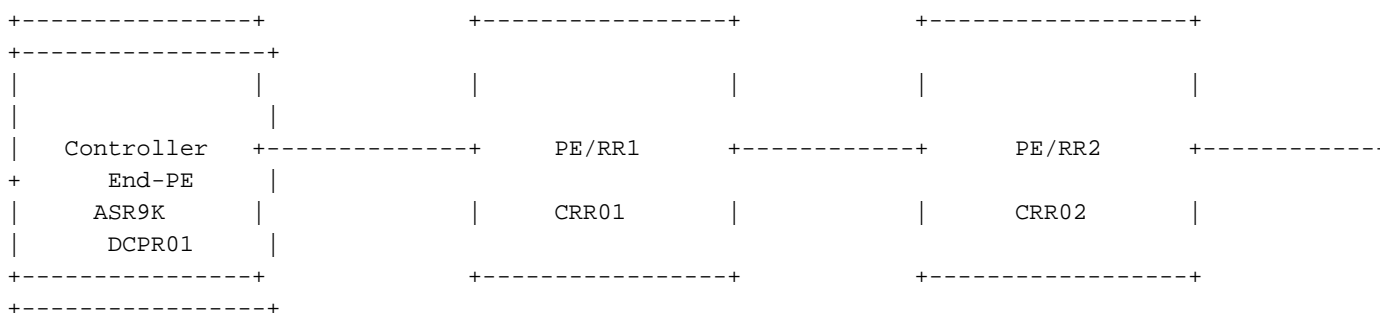
- 根據控制器配置，任何目的地為2001:db8::/32的流量都會根據策略被丟棄。
- 在ipv6 address-family下關閉鄰居的驗證，以便ASR1K不會檢查下一跳。
- 理想情況下，如果策略處於活動狀態，則會在控制器中看到計數器，但如果您希望在任何其他裝置上看到該計數器，請在所有使用者介面上安裝flowspec策略，在flowspec下需要local-

install interface-all命令。

故障排除期間面臨的挑戰

- 如果底層網路是IPv4，並且為IPv6運行BGP flowspec，則每個躍點的驗證檢查存在問題，並且會導致IPv6 Flowspec策略的問題。因此，請關閉**驗證**，以便鄰居不執行驗證檢查。
- 除了控制器之外，您無法看到flowspec策略匹配/操作計數器。為了檢查計數器，**local-install interface-all**必須位於Flowspec下（在AF下）。此命令將流量規範策略配置推送到裝置的所有介面上的IPv4和IPv6地址系列，以及VRF例項內的介面。

網路圖表



組態

此配置基於網路圖，與您的設定相同。

Controller:

```
RP/0/RSP0/CPU0:Controller# show running-config
Mon Apr  8 16:33:36.578 UTC
Building configuration...
!! IOS XR Configuration 5.3.4
!! Last configuration change at Wed Apr  3 17:34:59 2019 by admin
!
hostname Controller
cdp
cdp advertise v1
!
class-map type traffic match-all FLOWSPEC
  match destination-address ipv6 2001:db8::/32
end-class-map
!
class-map type traffic match-all V4_FLOWSPEC
  match source-address ipv4 102.102.102.102 255.255.255.255
end-class-map
!
policy-map type pbr FS_P
  class type traffic FLOWSPEC
    drop
  !
  class type traffic class-default
  !
end-policy-map
```

```

!
policy-map type pbr FSP_V4
  class type traffic V4_FLOWSPEC
    set dscp ef
  !
  class type traffic class-default
  !
end-policy-map
!
interface Loopback0
  ipv4 address 10.192.202.5 255.255.255.255
!
interface Loopback100
  ipv4 address 102.102.102.102 255.255.255.255
  ipv6 address 2001:db8::1/32
!
interface TenGigE0/0/0/0
  ipv4 address 10.10.12.1 255.255.255.0
  ipv6 address 2001:10:10:12::1/64
!
route-policy ALL
  pass
end-policy
!
router static
  address-family ipv4 unicast
    203.202.143.33/32 TenGigE0/0/0/0
  !
  address-family ipv6 unicast
    2003::/64 2001:10:10:12::2
  !
!
router ospfv3 1
  area 0
    interface TenGigE0/0/0/0
      network point-to-point
    !
  !
!
router bgp 64696
  bgp router-id 10.192.202.5
  address-family ipv4 unicast
    network 102.102.102.102/32
  !
  address-family vpnv4 unicast
  !
  address-family ipv4 flowspec
  !
  address-family ipv6 flowspec
  !
  neighbor 203.202.143.33
    remote-as 7474
    ebgp-multihop 10
    update-source Loopback0
    address-family ipv4 unicast
      route-policy ALL in
      route-policy ALL out
    !
    address-family vpnv4 unicast
  !
  address-family ipv4 flowspec
    route-policy ALL in
    route-policy ALL out
  !

```

```

address-family ipv6 flowspec
  route-policy ALL in
  route-policy ALL out
!
!
!
flowspec
local-install interface-all
address-family ipv4
  service-policy type pbr FSP_V4
!
address-family ipv6
  service-policy type pbr FS_P
!
!
end

```

PE/RR1:

```

CRR01#show running-config
Building configuration...

```

```

!
ipv6 unicast-routing
mpls label protocol ldp
!
spanning-tree extend system-id
flowspec
local-install interface-all
diagnostic bootup level minimal
!
interface Loopback0
 ip address 203.202.143.33 255.255.255.255
 ip ospf 1 area 0
!
interface Loopback1010
 no ip address
 ipv6 address 2001:DB8::10/32
!
interface TenGigabitEthernet0/0/0
 ip address 10.10.12.2 255.255.255.0
 ip ospf network point-to-point
 cdp enable
 ipv6 address 2001:10:10:12::2/64
!
interface TenGigabitEthernet0/0/3
 ip address 10.10.23.2 255.255.255.0
 ip ospf network point-to-point
 ip ospf 1 area 0
 cdp enable
 ipv6 address 2003::1/64
 mpls ip
!
router ospf 1
 mpls ldp autoconfig
!
router bgp 7474
 bgp router-id 203.202.143.33
 bgp log-neighbor-changes
 neighbor 10.192.202.5 remote-as 64696
 neighbor 10.192.202.5 ebgp-multihop 10
 neighbor 10.192.202.5 update-source Loopback0
 neighbor 2001:10:10:12::1 remote-as 64696

```

```
neighbor 203.202.143.44 remote-as 7474
neighbor 203.202.143.44 update-source Loopback0
!
address-family ipv4
  neighbor 10.192.202.5 activate
  no neighbor 2001:10:10:12::1 activate
  neighbor 203.202.143.44 activate
  neighbor 203.202.143.44 route-reflector-client
exit-address-family
!
address-family ipv4 flowspec
  neighbor 10.192.202.5 activate
  neighbor 203.202.143.44 activate
  neighbor 203.202.143.44 send-community both
  neighbor 203.202.143.44 route-reflector-client
exit-address-family
!
address-family ipv6
  neighbor 10.192.202.5 activate
  neighbor 203.202.143.44 activate
  neighbor 203.202.143.44 route-reflector-client
  neighbor 203.202.143.44 send-label
exit-address-family
!
address-family ipv6 flowspec
  neighbor 10.192.202.5 activate
  neighbor 10.192.202.5 validation off
  neighbor 203.202.143.44 activate
  neighbor 203.202.143.44 send-community both
  neighbor 203.202.143.44 route-reflector-client
  neighbor 203.202.143.44 next-hop-self
exit-address-family
!
ip route 10.192.202.5 255.255.255.255 10.10.12.1
!
!
ipv6 route 2001:DB8::1/128 2001:10:10:12::1
!
end
```

PE/RR2:

```
CRR02#show running-config
Building configuration...
```

```
Current configuration : 7227 bytes
```

```
!
! Last configuration change at 18:21:29 UTC Mon Apr 8 2019
!
hostname CRR02
!
boot-start-marker
boot system flash bootflash:asr1000rpx86-universalk9.16.10.01a.SPA.bin
boot-end-marker
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
flowspec
diagnostic bootup level minimal
!
interface Loopback0
```

```

ip address 203.202.143.44 255.255.255.255
ip ospf 1 area 0
!
interface TenGigabitEthernet1/0/0
ip address 10.10.23.3 255.255.255.0
ip ospf network point-to-point
ip ospf 1 area 0
cdp enable
ipv6 address 2003::2/64
mpls ip
!
interface TenGigabitEthernet1/0/1
ip address 10.10.34.3 255.255.255.0
ip ospf network point-to-point
ip ospf 1 area 0
cdp enable
!
router ospf 1
mpls ldp autoconfig
!
router bgp 7474
bgp router-id 203.202.143.44
bgp log-neighbor-changes
neighbor 203.202.143.33 remote-as 7474
neighbor 203.202.143.33 update-source Loopback0
neighbor 203.202.143.45 remote-as 7474
neighbor 203.202.143.45 update-source Loopback0
!
address-family ipv4
neighbor 203.202.143.33 activate
neighbor 203.202.143.45 activate
exit-address-family
!
address-family ipv4 flowspec
neighbor 203.202.143.33 activate
neighbor 203.202.143.45 activate
neighbor 203.202.143.45 send-community both
neighbor 203.202.143.45 route-reflector-client
exit-address-family
!
address-family ipv6
neighbor 203.202.143.33 activate
neighbor 203.202.143.33 send-label
exit-address-family
!
address-family ipv6 flowspec
neighbor 203.202.143.33 activate
neighbor 203.202.143.33 validation off
neighbor 203.202.143.45 activate
neighbor 203.202.143.45 send-community both
neighbor 203.202.143.45 route-reflector-client
exit-address-family
!
ipv6 route 2001:10:10:12::/64 2003::1
ipv6 route 2001:DB8::1/128 2003::1
!
end

```

End-PE:

```

DCPR01#show running-config
Building configuration...
!

```

```

hostname DCPR01
!
subscriber templating
!
ipv6 unicast-routing
!
flowspec
diagnostic bootup level minimal
!
interface Loopback0
 ip address 203.202.143.45 255.255.255.255
 ip ospf 1 area 0
!
interface TenGigabitEthernet1/3/0
 ip address 10.10.34.4 255.255.255.0
 ip ospf network point-to-point
 ip ospf 1 area 0
 cdp enable
 ipv6 address 2001::1/64
!
router ospf 1
 mpls ldp autoconfig
!
router bgp 7474
 bgp router-id 203.202.143.45
 bgp log-neighbor-changes
 neighbor 203.202.143.44 remote-as 7474
 neighbor 203.202.143.44 update-source Loopback0
!
 address-family ipv4 flowspec
  neighbor 203.202.143.44 activate
 exit-address-family
!
 address-family ipv6 flowspec
  neighbor 203.202.143.44 activate
  neighbor 203.202.143.44 validation off
 exit-address-family
!
ipv6 route ::/0 TenGigabitEthernet1/3/0
!
end

```

驗證

```

PE/RR2:
CRR02#ping 2001:db8::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8::1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
CRR02#

```

```

Controller:
RP/0/RSP0/CPU0:Controller#show bgp ipv6 flowspec
Mon Apr  8 17:55:17.041 UTC
BGP router identifier 10.192.202.5, local AS number 64696
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0x0   RD version: 20

```



```
BGP main routing table version 20
BGP NSR Initial initsync version 0 (Reached)
BGP NSR/ISSU Sync-Group versions 0/0
BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best
               i - internal, r RIB-failure, S stale, N Nexthop-discard
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop              Metric LocPrf Weight Path
*> Dest:2001:db8::/0-32/56
               ::                                0 i
```

```
Processed 1 prefixes, 1 paths
RP/0/RSP0/CPU0:Controller#show flowspec ipv6 detail
Mon Apr  8 17:55:36.786 UTC
```

```
AFI: IPv6
Flow          :Dest:2001:db8::/0-32
Actions       :Traffic-rate: 0 bps (policy.1.FS_P.FLOWSPEC)
Statistics    (packets/bytes)
  Matched      :                14/1652
  Dropped     :                14/1652
RP/0/RSP0/CPU0:BGL14.1.J.05-ASR-9000-1#
```

```
PE/RR1:
CRR01#show bgp ipv6 flowspec
BGP table version is 2, local router ID is 203.202.143.33
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
               t secondary path,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop              Metric LocPrf Weight Path
*>  Dest:2001:DB8::/0-32
               ::                                0 64696 i
```

```
CRR01#
CRR01#show flowspec ipv6 detail
AFI: IPv6
Flow          :Dest:2001:DB8::/0-32
Actions       :Traffic-rate: 0 bps (bgp.1)
Statistics    (packets/bytes)
  Matched      :                4/456
  Dropped     :                4/456
```

```
CRR01#
```

疑難排解

目前尚無適用於此組態的具體疑難排解資訊。

提示：如果您開啟含有3.16.5S的個案，並使用[CSCva5510](#)錯誤id連線。雖然錯誤中未記錄此錯誤，但它適用於IPv6。這已在ASR1K BGP BU中確認，並已驗證。另一個錯誤[CSCvp18767](#)對於show命令（已在16.12.1中修正）也存在欄位，因此最好使用此版本。但是，IPv6 flowspec可以在任何16.x版本中工作。